Worksheet 2 Database concepts **Answers**

Task 1: Entity relationship diagrams

1. What is an **entity** in the context of databases?

   A category of person , object, event or thing of interest about which data is held

   (NOT "an entity is a person or thing about which data is held " – this is an **instance** of an entity. Such a definition won't get any marks in an exam!)

2. The relationship between two entities may be one of three types, or degrees.

   What are the three degrees of relationship between entities?

   One-to-One

   One-to-Many

   Many-to-Many

3. Draw entity relationship diagrams for each of the following pairs of related entities:

   (a) Dentist and patient

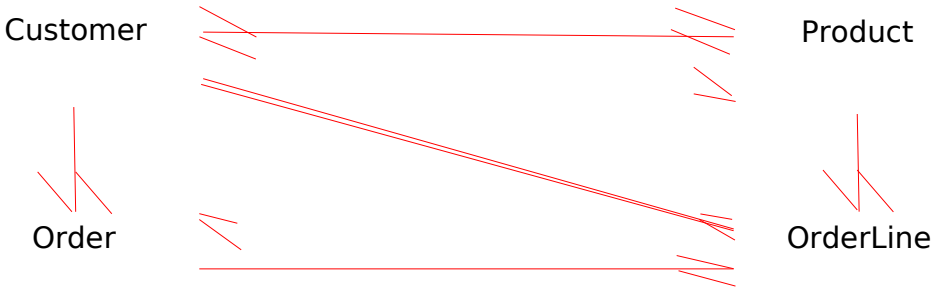
   (b) Student and teacher

   (c) UK citizen and UK Passport

   (d) Product and component

4. A company makes a range of kitchen utensils which they sell online. They record details of their customers, products and orders received in a database. An order may be for several products.

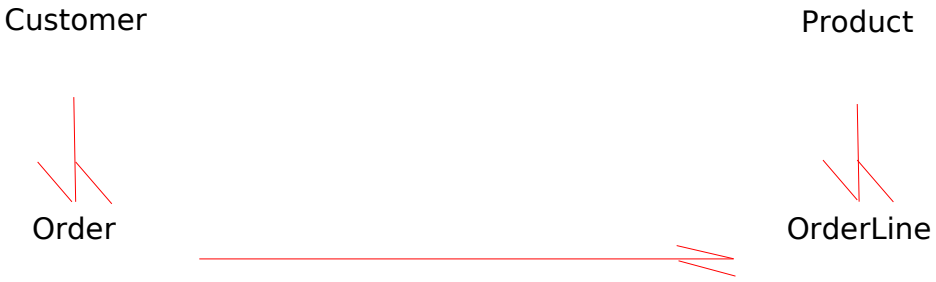
   Complete the E-R diagram to show all the relationships between all the entities.



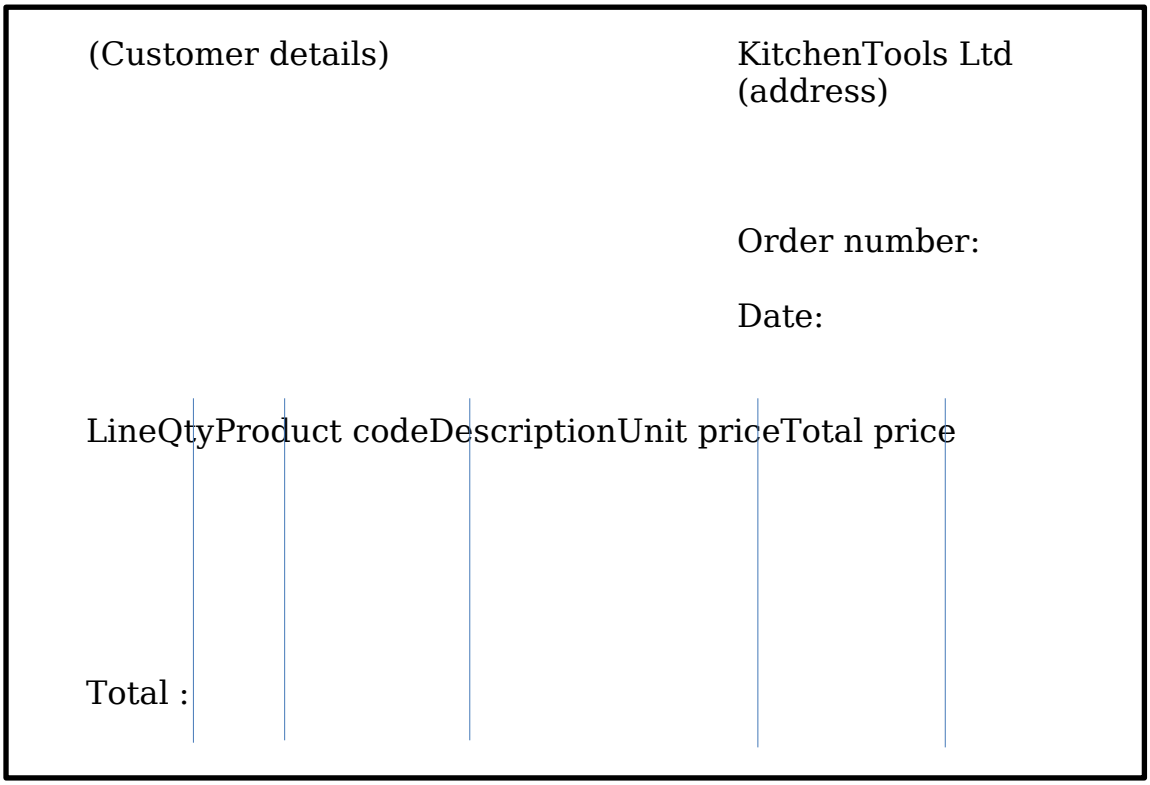
Note that the diagram above shows relationships such as:

- a many-to-many relationship between Customer and Product, indicating that a Customer may buy many products and a particular product may be bought by many customers
- a one-to-many relationship between Customer and OrderLine, indicating that a customer may have several order lines which relate to them, and a particular order line in an order can only relate to a single customer

These relationships cannot all be implemented in a normalised database, and they do not need to be. The relationships between the entities represented by database tables will be as shown below.



5. Complete the design of the order form shown below. Enter some data for a sample order for 3 different products.



On your order form, what are the primary key fields of the entities Customer, Product, Order, OrderLine?

Customer: Customer Number/ID

Product: Product code

Order: Order Number

Order line: OrderNumber + Line (This is a **composite key**, i.e. a key consisting of more than one attribute.)

Task 2

This is a practical exercise using MS Access. You are going to be working with the database **RevisionSubs_stage1.accdb**. This consists of three tables called **tblCustomer, tblProduct, tblSubscription.**

Step 1: Add some records to the database

1. Load Access and find the database called **RevisionSubs_stage1.accdb**.
2. Open the database. Double-click the table **tblCustomer** and it will appear in **Datasheet View**. In this view, you can enter, delete or amend data.
3. Add the following record to the table **tblCustomer**

   C444 Mr Basil Brown basil@brown.com
4. Add the following two records to **tblSubscription**

   S1400 21/03/2016 20/06/2017 C444 P47

   S1401 21/03/2016 20/06/2017 C444 P36

Step 2: Designate primary key attribute in each table

The **structure** of a table is defined when it is first created. These tables have been defined without primary keys, so the structure needs to be amended to define one or more fields in each table as a primary key.

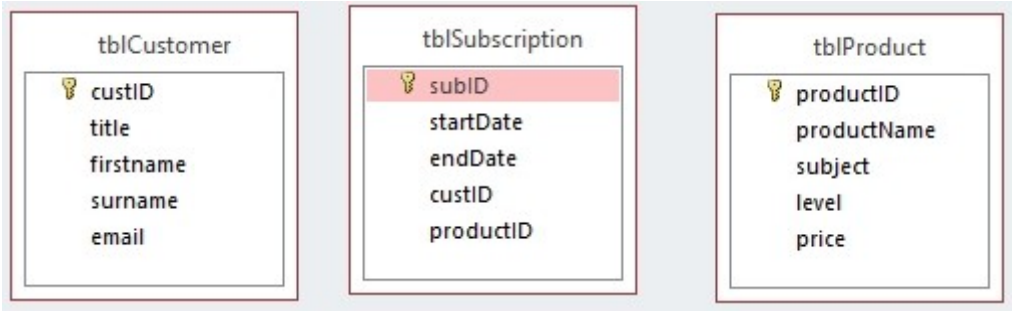
5. Click **tblCustomer**. Click **View** at the left hand end of the toolbar underneath the main menu, and select **Design View**.
6. Click the **custID** field name. Now click the **Primary key** icon in the toolbar.
   A key symbol appears next to the field name.
7. In **tblProduct**, make **productID** a key field.
8. In **tblSubscription**, make **subID** a key field.
9. Right-click the tabs for each table in turn, and choose **Close** each time. Answer **Yes** when asked if you wish to save the table.

Step 3: Creating relationships between the tables

We now need to create the one-to-many relationship between **tblCustomer** and **tblSubscription**, and the one-to-many relationship between **tblSubscription** and **tblProduct**.

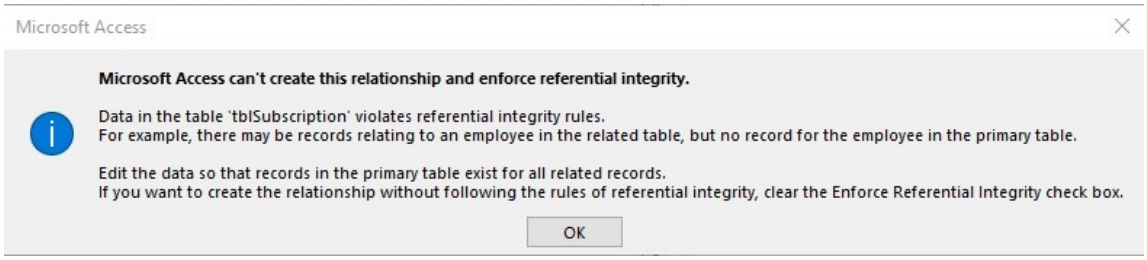
10. Click **Database Tools** in the main menu. Then double-click the **Relationships** icon in the toolbar.

11. A “Show table” window opens. Click each table in turn and click **Add**. Close the window and you will see the three tables displayed. Click and drag to put **tblSubscription** in the middle.



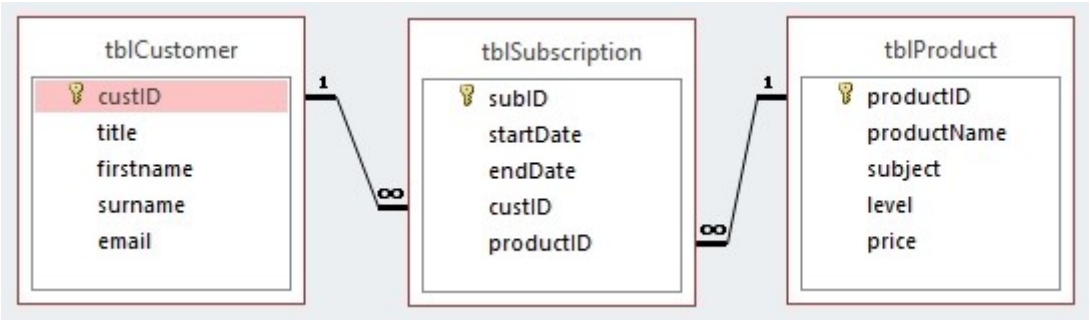
12. To create a relationship, you drag the primary key field from the “one” side to the corresponding field in the “many side of the related table. Drag **CustID** from **tblCustomer** table to **custID** in **tblSubscription**.
13. A window appears. Click the box next to **Enforce referential integrity**. This will ensure that you cannot create a record in **tblSubscription** for a customer who does not exist in **tblCustomer**. Now click **Create**.

    If there is already data in **tblSubscription** which refers to a non-existent customer, you will see this message:


Microsoft Access
Microsoft Access can't create this relationship and enforce referential integrity.
Data in the table 'tblSubscription' violates referential integrity rules.
For example, there may be records relating to an employee in the related table, but no record for the employee in the primary table.
Edit the data so that records in the primary table exist for all related records.
If you want to create the relationship without following the rules of referential integrity, clear the Enforce Referential Integrity check box.
OK

    If you get this message, you need to take another look at the records in **tblCustomer** and **tblSubscription** and make sure you have all the necessary records on **tblCustomer**.
14. Create the relationship between **tblProduct** and **tblSubscription**. Remember to enforce referential integrity.

    Now the relationships will be shown:



15. **Save** and close the database.